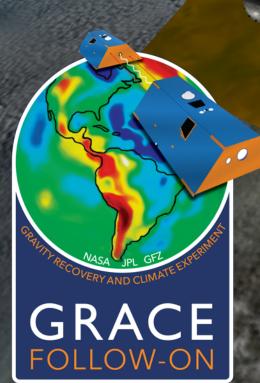
First gravity field and mass change observations from GRACE Follow-On_

European Geosciences Union General Assembly Vienna, Austria, 11 April 2019



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GRACE-FO has transitioned from In-Orbit Checkout to Science Operations (Phase E)

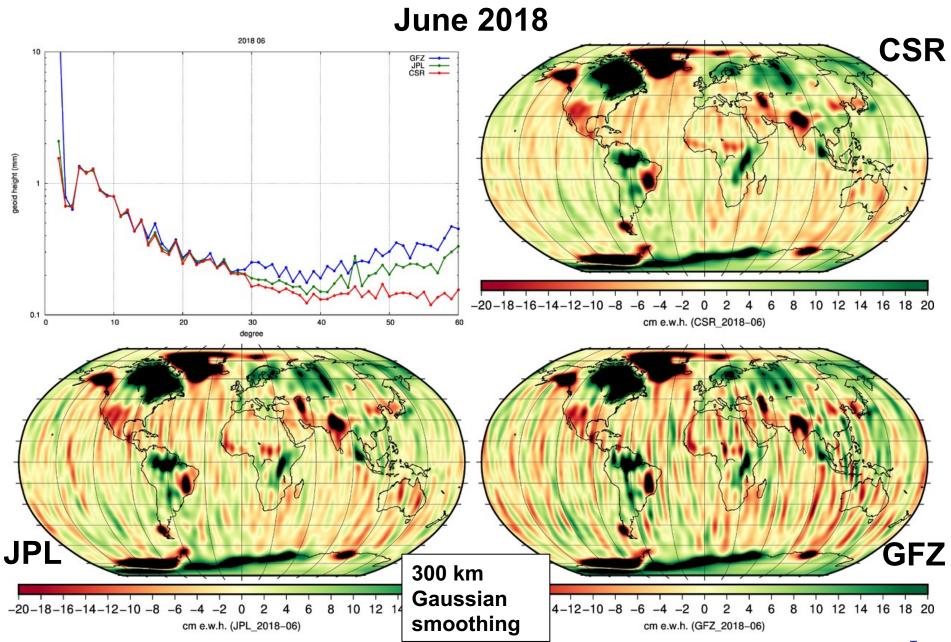
- First 120 days of Phase E includes:
 - Validation & verification of gravity field performance
 - Evaluating and improving calibration strategies
 - Tuning of gravity field estimation strategy
- Release of first data products is on schedule:
 - Level-1 data no later than May-28, 2019
 - Level-2 data no later than Jul-28, 2019
 - LRI data no later than Jul-28, 2019

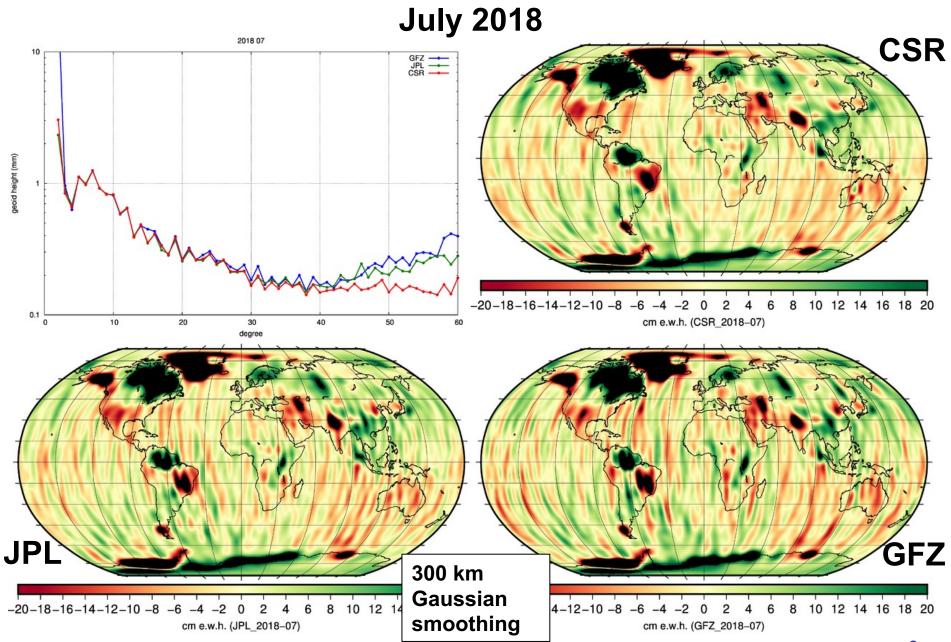
Since launch: 8 periods for gravity fields!

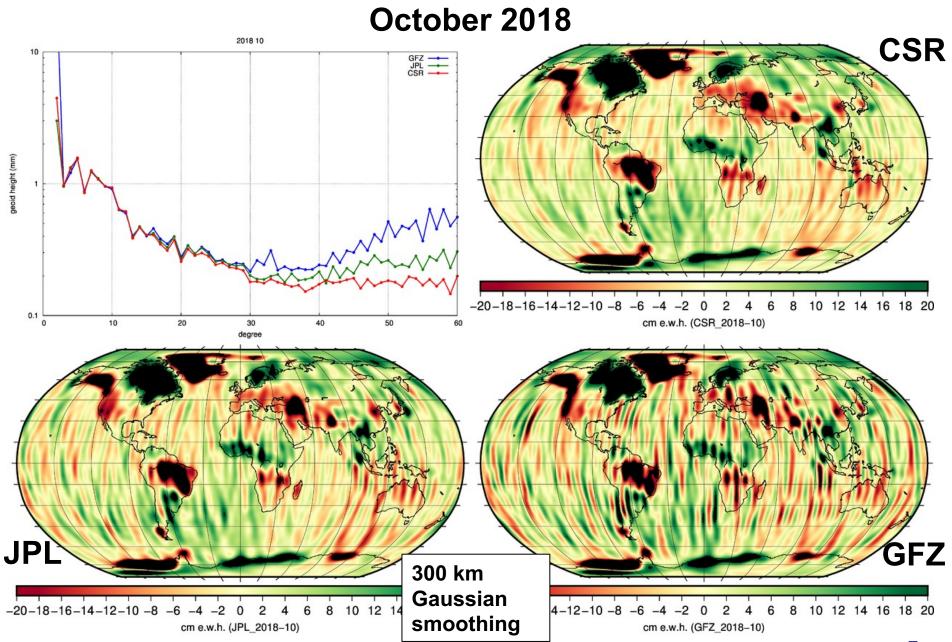


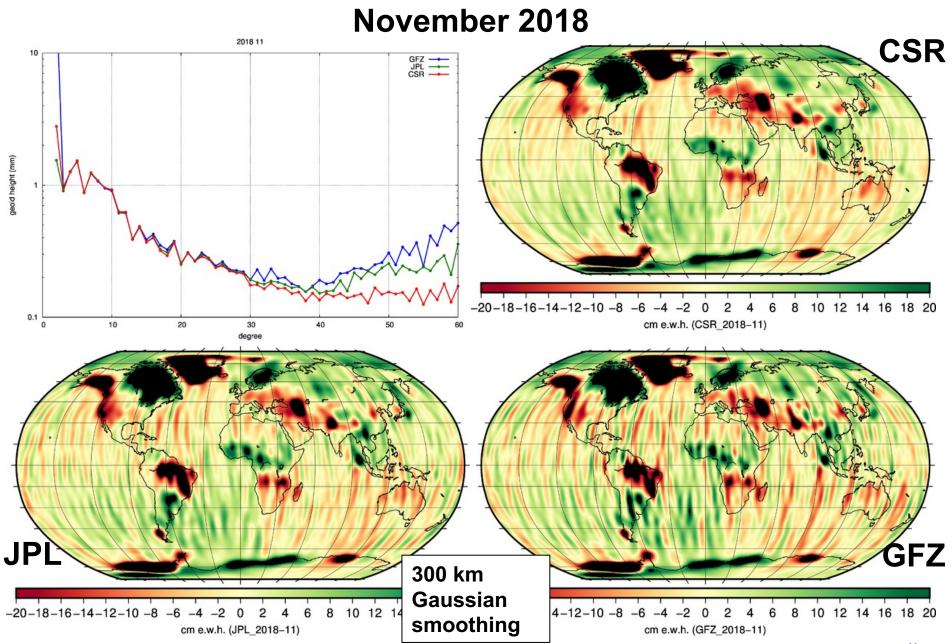
Processing Details (Level-1 and Level-2 V&V)

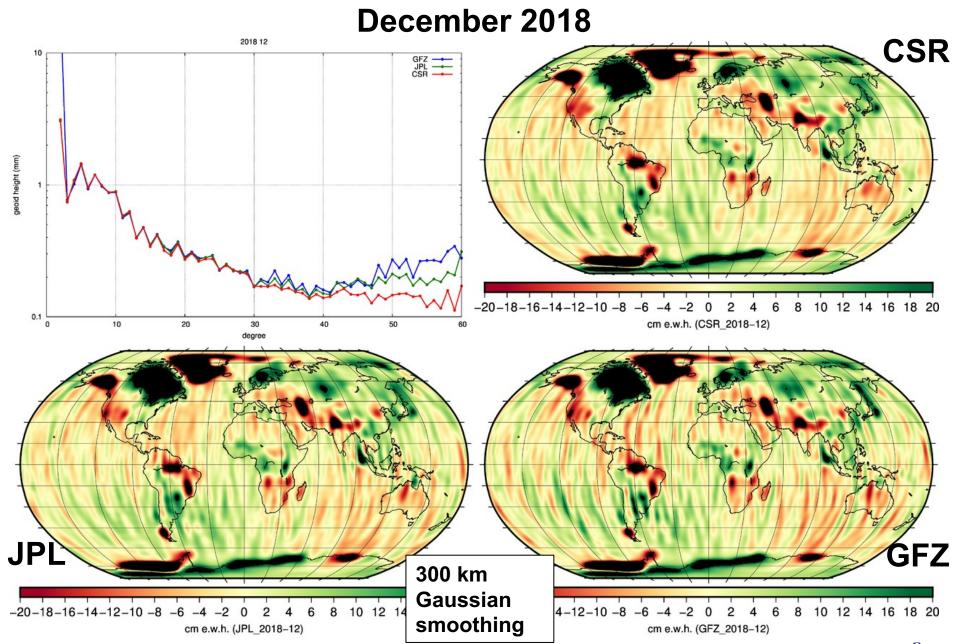
- L1B data:
 - SCA1B, KBR1B: based on STR+IMU combination for attitude
 - Accelerometer: ACT1B product (new!)
 - GF1: phantom spikes removed, roll/pitch/yaw thrusts removed and restored via a calibrated model
 - GF2: transplanted from GF1 (all 3 axes, corrected as described above), thrusts restored via a calibrated model
- Changes in processing strategy compared to GRACE RL06:
 - JPL: RL06 standards; parametrization changes: ACC full scale matrix is estimated once per month rather than once per day
 - GFZ: RL06 standards; parametrization changes: ACC full scale matrix estimated once per month has been added
 - CSR: RL06 standards ("2-step approach" same as GRACE RL06);
 parametrization changes: ACC full scale matrix is estimated once
 per month rather than once per day

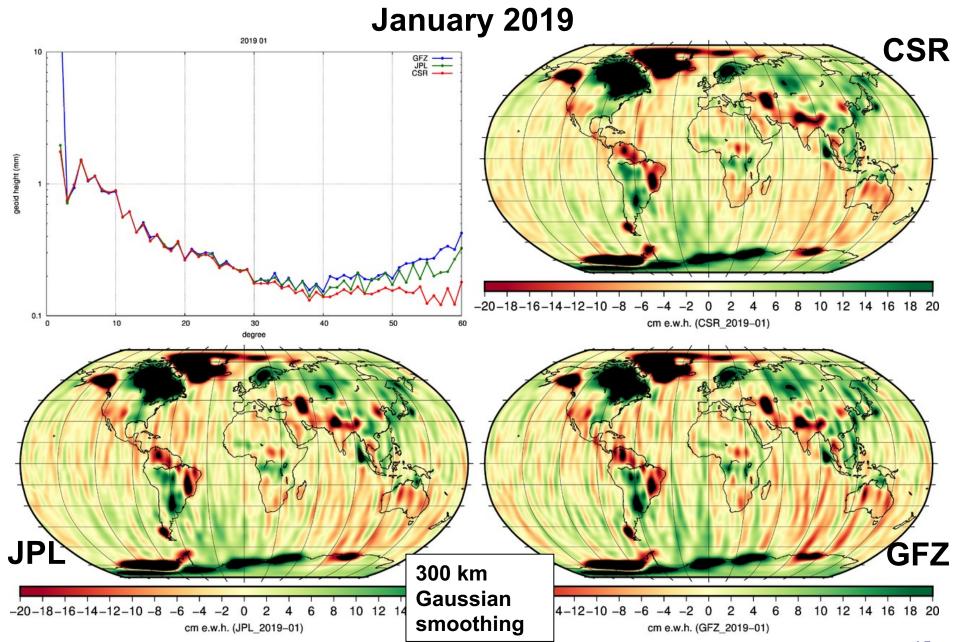




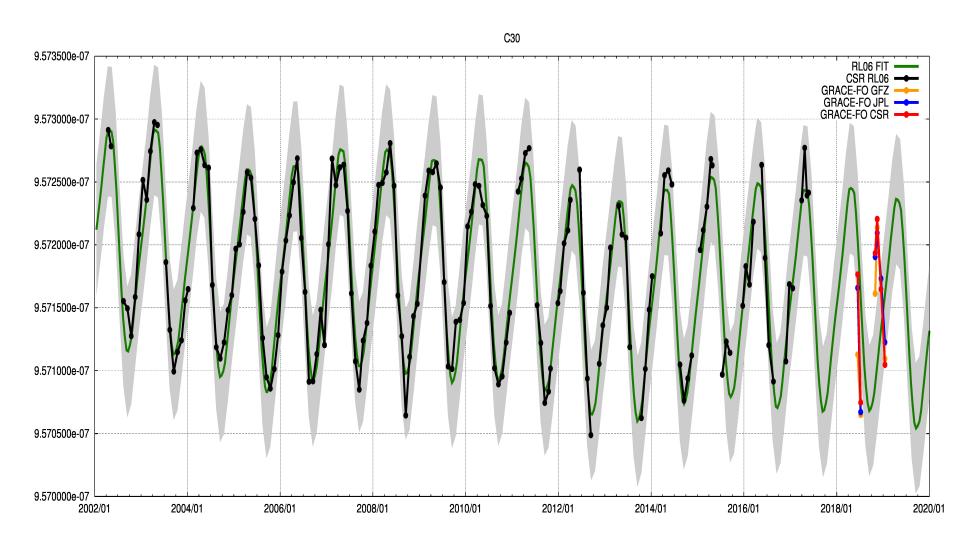




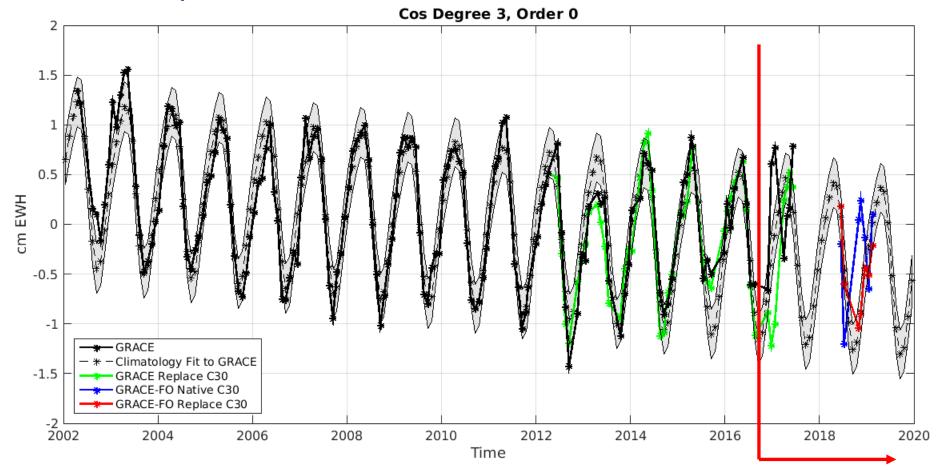




 C₃₀ seems particularly vulnerable to ACC transplant data → not fully understood yet

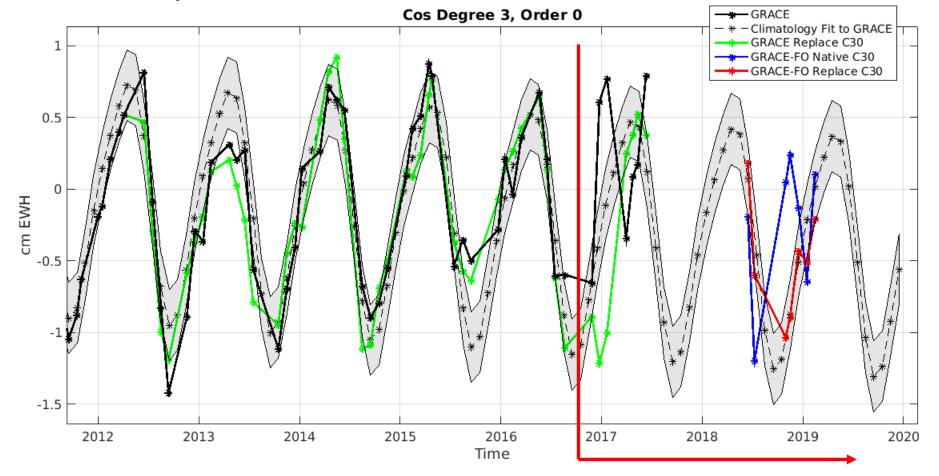


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- replacement by SLR solution might be an option (here: GSFC solution)



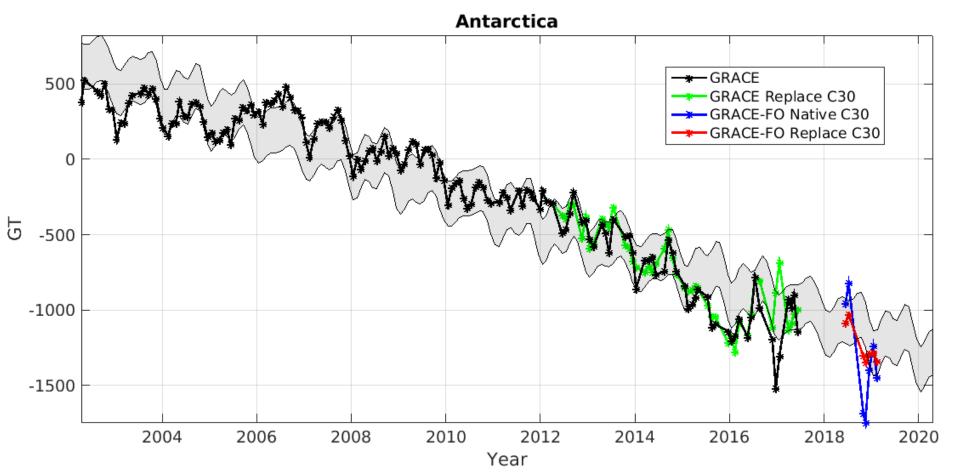
Single Accelerometer Mode

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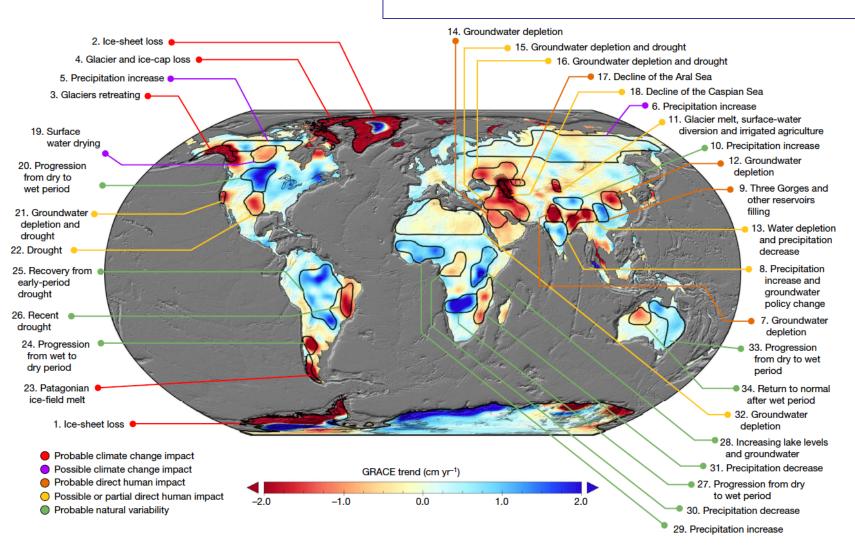
Single Accelerometer Mode

- C₃₀ replacement impact on mass balance in Antarctica
 - errors in C_{30} affect certain regions more than others; Antarctica is one region that is particularly sensitive to C_{30}
 - the scatter in the GRACE-FO months and GRACE single accelerometer months decreases with replacement indicating a quality improvement



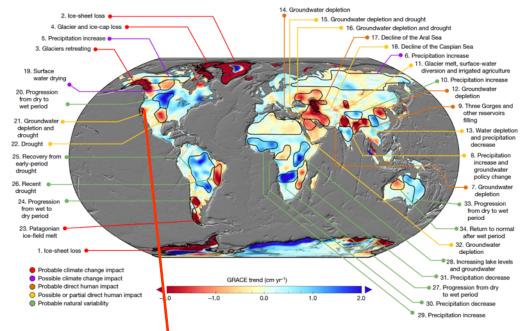
Emerging trends in global freshwater availability

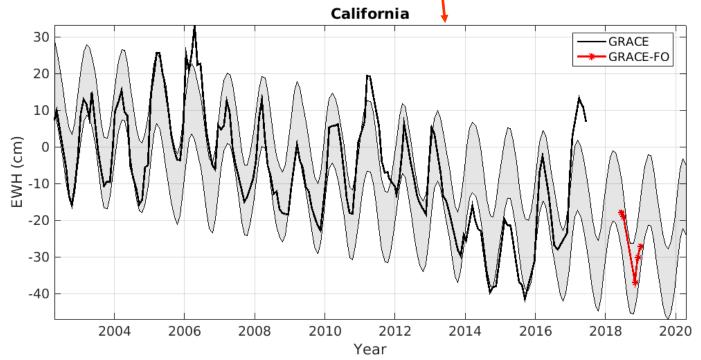
M. Rodell¹*, J. S. Famiglietti^{2,5}, D. N. Wiese², J. T. Reager², H. K. Beaudoing^{1,3}, F. W. Landerer² & M.-H. Lo⁴



Continuity

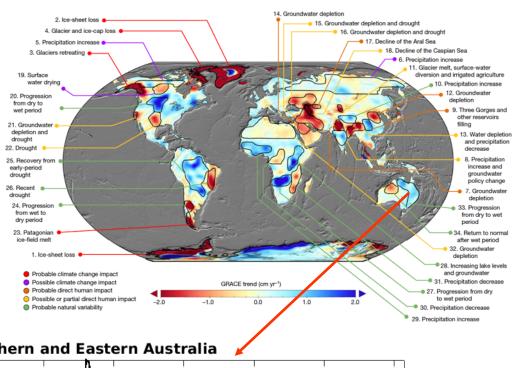
Groundwater Depletion and Drought

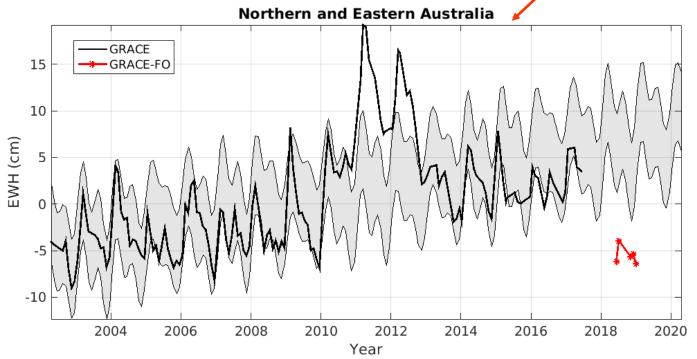


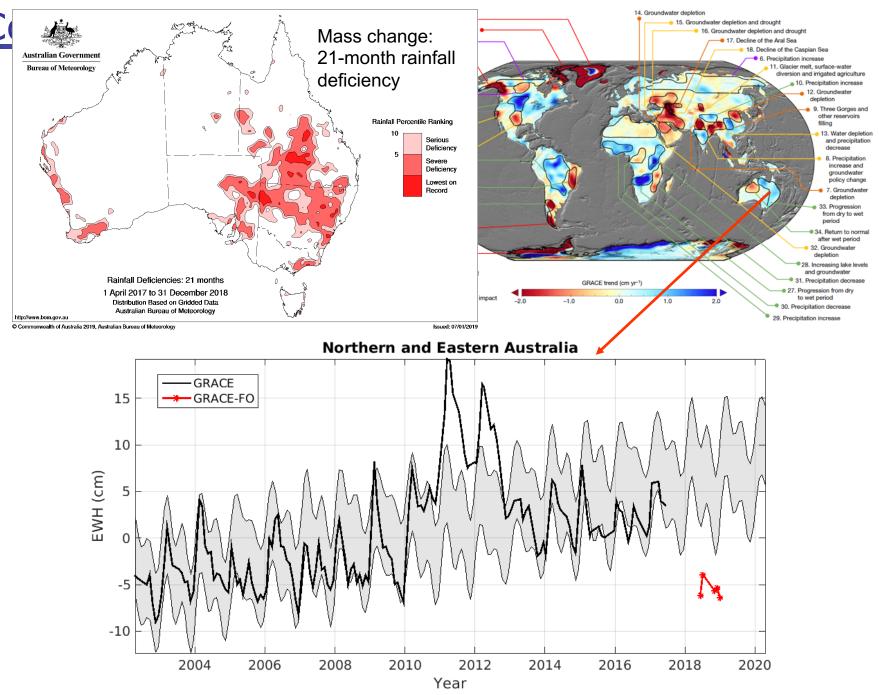


Continuity

Natural Variability and Recent Drought

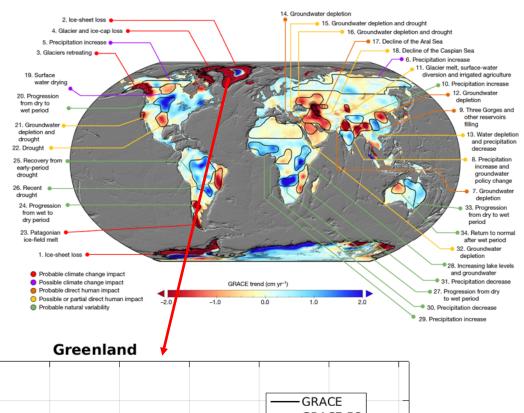


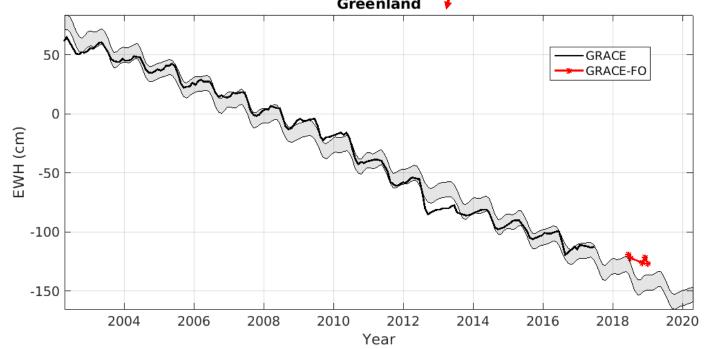


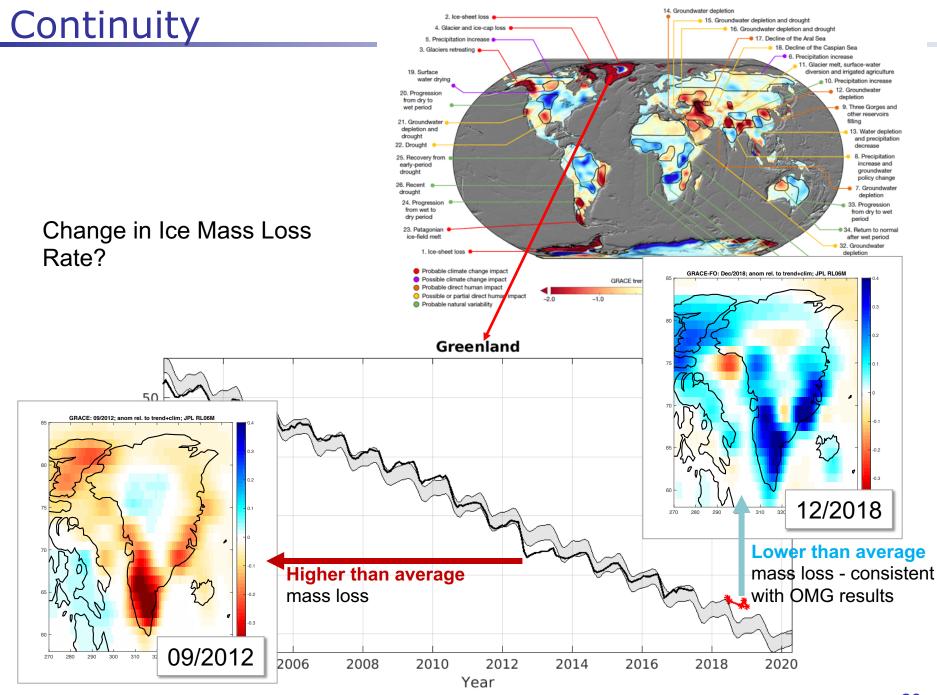


Continuity

Change in Ice Mass Loss Rate?

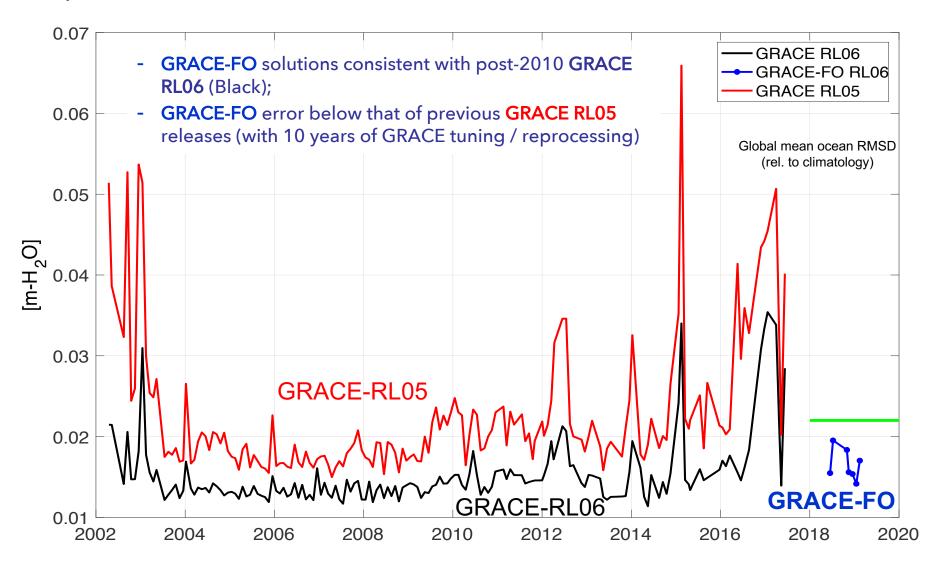






GRACE-FO Performance

GRACE-FO performance meets the Level 1 science and technology requirements.



Summary

Initial V&V has demonstrated that GRACE-FO is meeting the science performance required for continuity with GRACE!

- L1B products are of good quality (same or better than GRACE) except for ACC1B (GF2)
 - The SDS provides a new ACC product called ACT1B for both GF1 and GF2
 - ACT1B for GF2 is currently a full transplant from GF1
- Since launch, 8 preliminary monthly gravity fields have been produced (only first 6 are shown in this presentation)
 - Showing reasonable mass change signals
 - Deviations from long-term trends & climatology qualitatively consistent with interannual climate variations (e.g., Australia, Greenland)
 - Error level already on par with GRACE RL05 (final calibrations like KBR-cal still to be done)
 - Low degrees need special attention, in particular C_{30} (possible replacement product available)
- SDS is finalizing verification and validation before 1st official Level-1 data release on May-28, 2019
- First Level-2 data release on July-28, 2019

Looking forward to see you at the GSTM-2019 on Oct 8-10 in Pasadena!